Preface

In the context of current issues involved with the design and optimization of engineering components, materials and processes at different length- and time-scales, multi-scale modeling methods play a decisive role in both the industrial and academic sectors. The optimal adjustment of the material and structural characteristics by means of controlled production and processing steps requires a fundamental understanding of all mechanisms interacting on different length- and time-scales in the materials considered. In order to formulate the corresponding models and algorithms, considerable research work is still necessary, both in theoretical and in computational material mechanics.

The 3rd Seminar of the German Society for Applied Mechanics and Mathematics (GAMM) on Multiscale Material Modelling took place at KIT - Karlsruhe Institute of Technology, Germany from June 26 to June 27, 2009. This seminar, sponsored by the Topical Committee "Multiscale Material Modeling" of the German Society for Applied Mechanics and Mathematics (GAMM), was attended by 46 scientists from 22 research institutions. This volume documents selected research work presented at the Seminar.

The Topical Committee "Multiscale Material Modeling" (M3) of the German Society for Applied Mechanics and Mathematics is currently being chaired by Thomas Böhlke (KIT - Karlsruhe Institute of Technology, Germany) and Stefan Diebels (Saarland University, Germany). It succeeded the Topical Committee "Theory of Materials" in 2006. The purpose of M3 is to provide a forum for scientific interaction and cooperation in the area of multiscale modeling. The research group within M3 organizes the Section "Multiscale and Homogenization" at the annual conferences of the German Society for Applied Mechanics and Mathematics and hosts a seminar once a year. This seminar facilitates scientific exchange between young researchers and well-established scientists in the fields of applied mathematics, mechanics, and material science. The seminar provides the opportunity to present new approaches to material modeling, homogenization and computational mechanics within the context of heterogeneous materials.

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